

92nd Annual Conference & Exhibition

Tuesday April 16, 2019

Today's Highlights:

- Technical Program
- Manufacturer's Exhibition Grand Opening at 10:30am
- Meter Mania, Top Ops Trivia and Hydrant Hysteria Competitions
- Lunch in the Exhibition Hall beginning at 11:30am (or on your own)
- Manufacturer's Happy Hour in Exhibit Hall (5pm – 6pm)
- BBQ at Copper Blues /Stand Up Live beginning at 6pm

Don't forget to:

- Download our app!
- Use the mobile app to
 - Complete the Fresh Ideas Scoring
 - Take the Conference Survey and rate sessions
- Wait until end of each session to scan out
- Silence cell phones and electronic devices

Potable Reuse the Answer?: Case Study for an Arizona Community

Steve Camp

Steve is the Regulatory Compliance Manager for City of Flagstaff Water Services, where he oversees compliance with APP, AZPDES, and Stormwater programs. Steve has a degree in Chemical Engineering and has more than 25 years of regulatory experience in drinking water, wastewater, stormwater and air quality.

Katie Vanyo

Katie is an environmental engineer with Brown and Caldwell in the Water Consulting Services Water Group. With Brown and Caldwell, she has had the opportunity to get involved with a wide variety of water and wastewater projects including water treatment, odor control, and solids processing technologies, with an emphasis on water reuse. Katie has been in the engineering industry for over 6 years.

Advanced Treatment Facility for Direct Potable Reuse: **WHY NOW?**

- Water Resources Master Plan
 - As Flagstaff plans for the future, new sources must be evaluated
- Current Sources
 - Lake Mary
 - Inner Basin
 - Well Fields
- Future Sources
 - Red Gap Ranch



Current Source: Lake Mary

- Surface Water Plant
- 8 MGD Design Flow



Current Source: Inner Basin



- Seasonal
- 2 MGD Max Design Flow
- Dependent on Snow Pack

Current Source: Wellfields

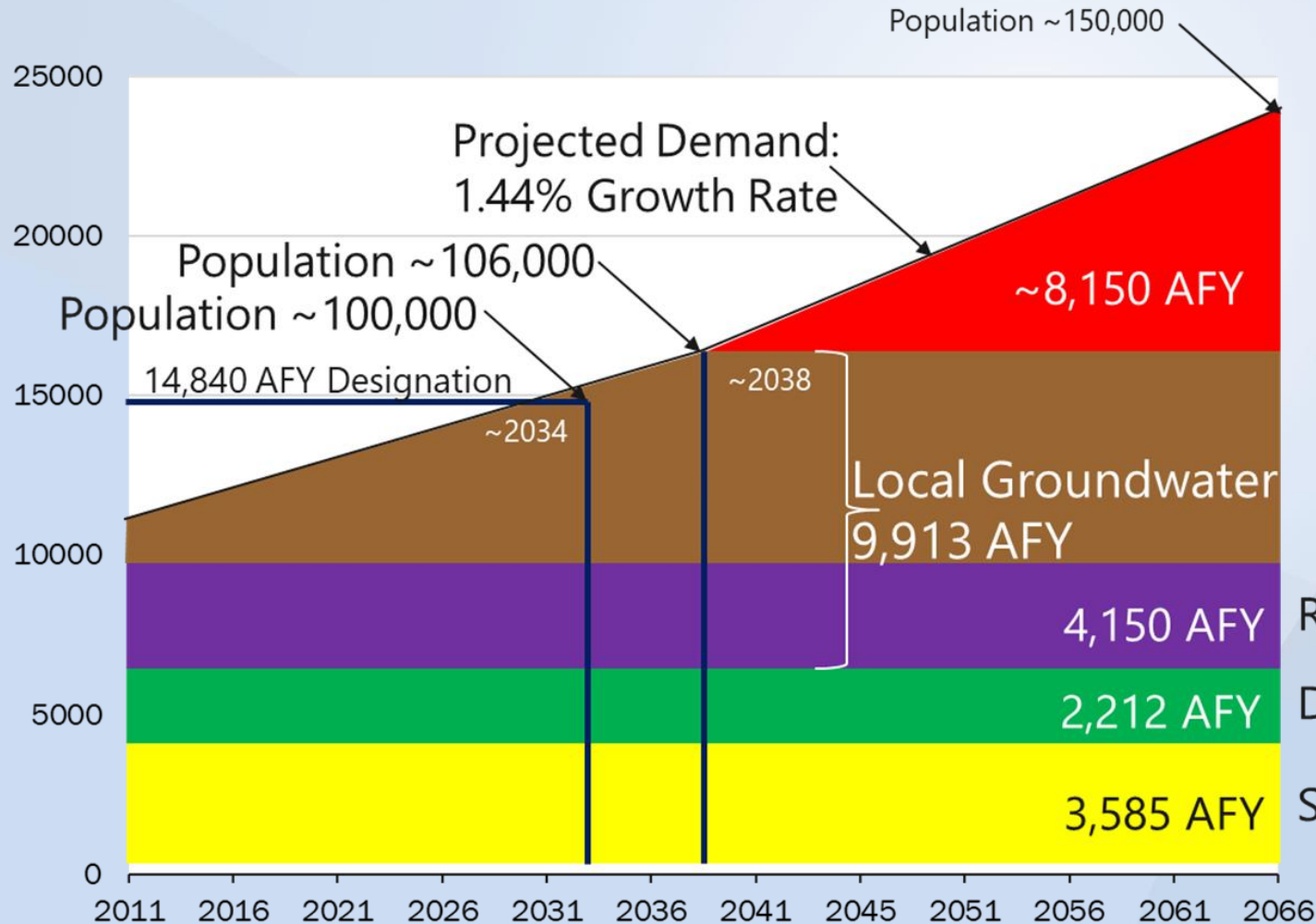


Future Potential Source: Red Gap Ranch

40 Miles East of Flagstaff



Flagstaff Must Be Proactive to Obtain New Water Supplies



New Water Supply

*Red Gap Ranch and/or
Local Potable Reuse*

Renewable Portion of Local Groundwater
Direct Delivered Reclaimed (Irrigation Use)
Surface Water

2017 Water Deliveries

- **GROUNDWATER**
5,921 AF 58%
- **SURFACE WATER**
1,766 AF 21%
- **RECLAIMED WATER**
2,189 AF 21%

Water Conservation – decrease
in GPCD ~40% since 1980s

Upper Lake Mary



Construction Water



DPR is Just One Way to Provide Water for Future Generations



Direct Potable Reuse or Indirect Potable Reuse

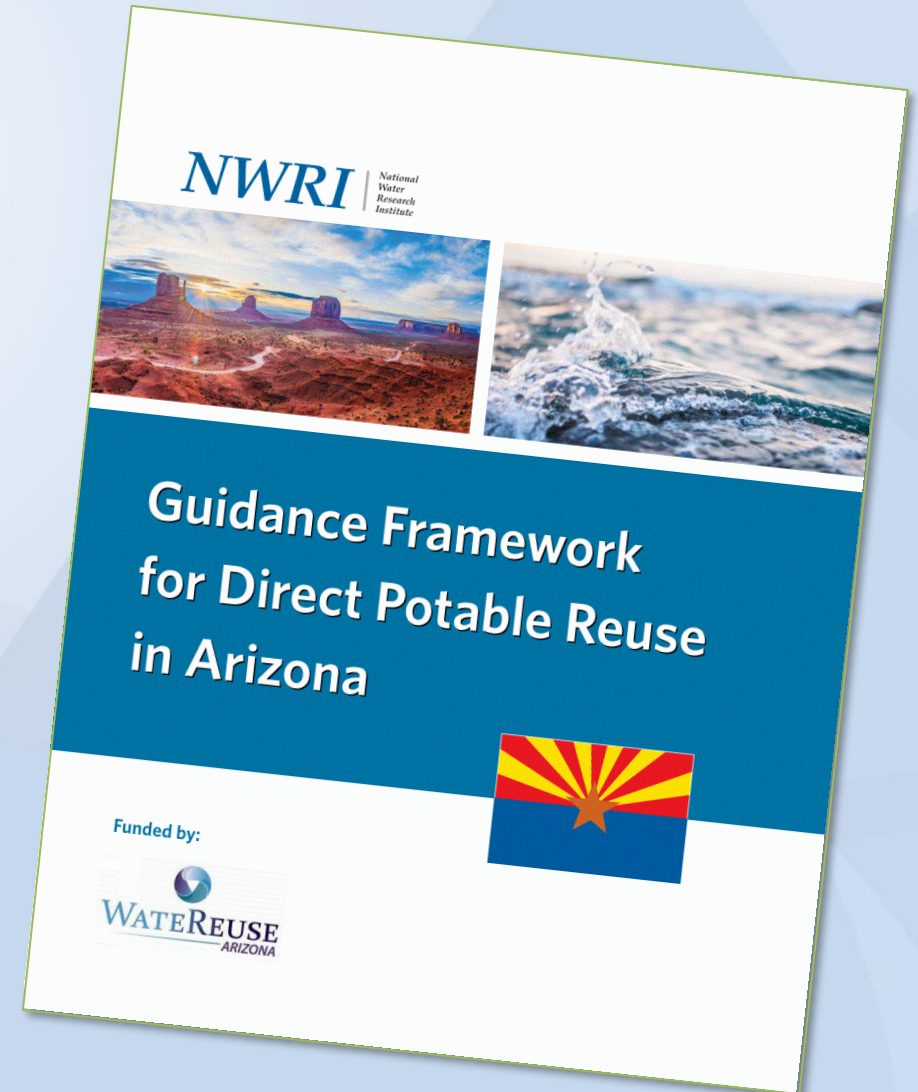
Public Outreach Prior to Rule Change

- Pure Water Brew Challenge – Parallel with Rule Rewrite
- ADEQ Substantive Policy
 - April 27, 2017
 - Purpose was to provide a temporary interpretation of “direct reuse for human consumption” under current reclaim rules
 - Provides definition for “Advanced Water Treatment Facility”
- Advanced treatment reclaimed water permit
 - First and only in state



Status of Arizona DPR Rules and Regulations

- 2017: ADEQ workgroups Reuse Rule Update and recommendations for advanced treatment rules
 - Recycled Water Quality Water Standards
 - Recycled Water Infrastructure and Technology
- January 1, 2018:
 - DPR Prohibition Rescinded,
 - Interim rule for advanced treatment pilot projects
- January 31, 2018: WaterReuse AZ releases the “Framework for Direct Potable Reuse in Arizona” prepared by NWRI
- Final rule and guidance for advanced treatment under development



Regulatory Approach

Microbial Contaminant Control

- Texas Approach: Characterize treated WW like SDWA approach
- California Approach: 12-10-10 log removal starting from raw WW

Chemical Control

- **Tier 1: Drinking Water MCLs**
- **Tier 2: Unregulated but of interest for public health**
- **Tier 3: Unregulated, used to monitor treatment performance**

What's unique about Arizona's approach



- Recommending either California or Texas Approach to treatment performance requirements
- Reverse Osmosis explicitly not required unless needed for salinity management
- Must demonstrate compliance with Class A+ quality at some point along process train

Review

- Flagstaff Needs Future Water Source to Maintain Growth
- Pure Water Brew Challenge – DPR is Possible and Safe
- Rule Rewrite – Prohibition Removed
- Future Rules for DPR with ADEQ – Arizona Approach



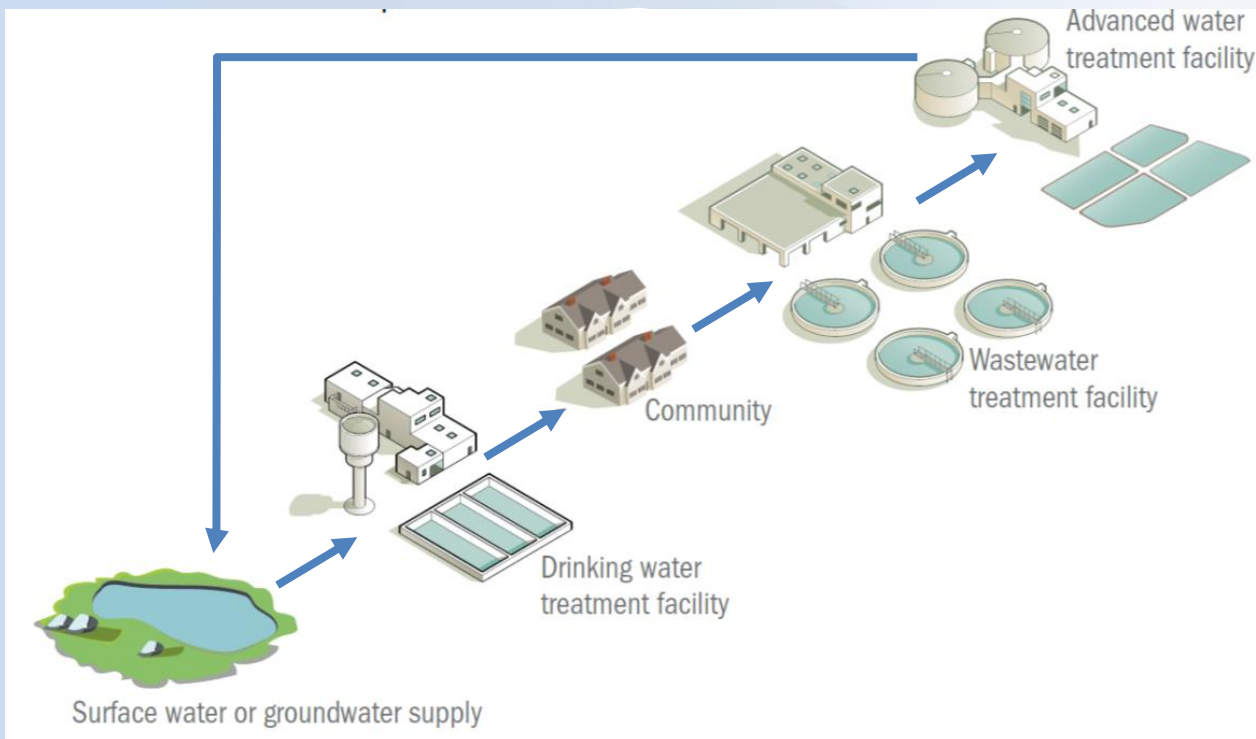


FLAGSTAFF
WATER SERVICES
We are Water

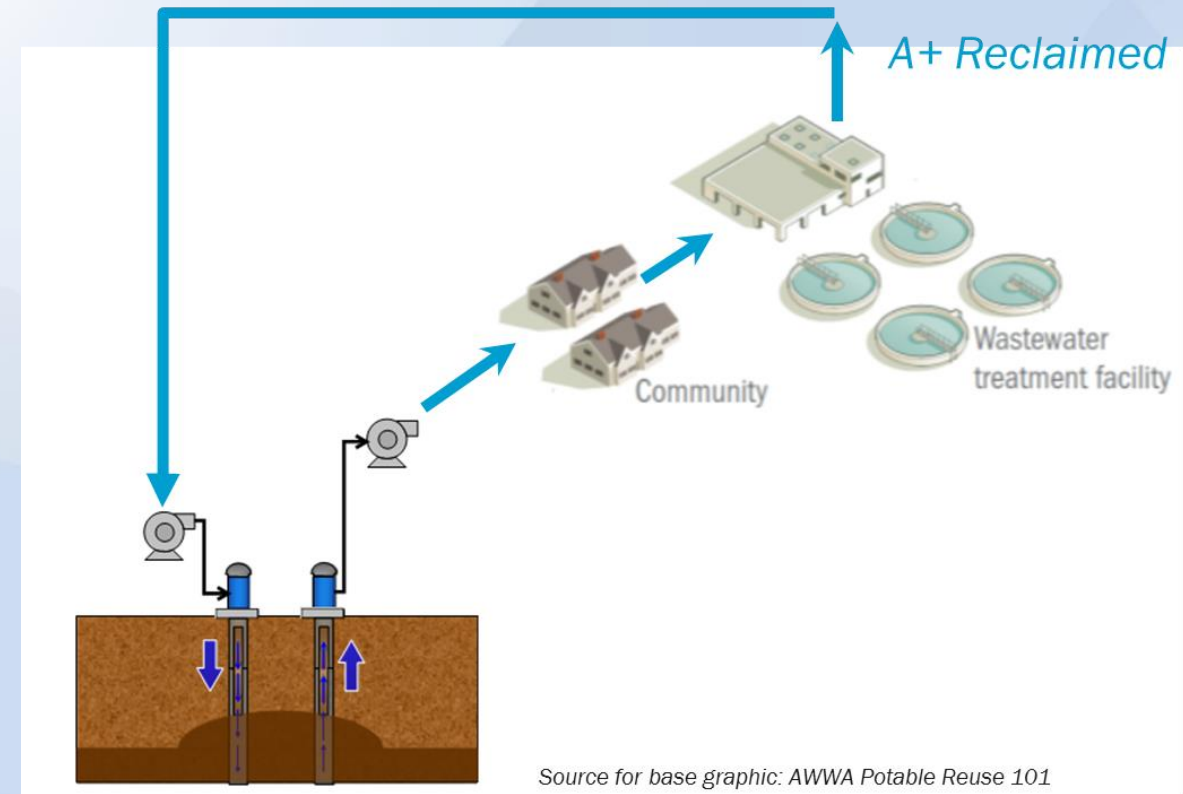
Flagstaff Water Services DPR Feasibility and Outreach

Definition of Potable Reuse

Indirect Potable Reuse by Surface Water Augmentation



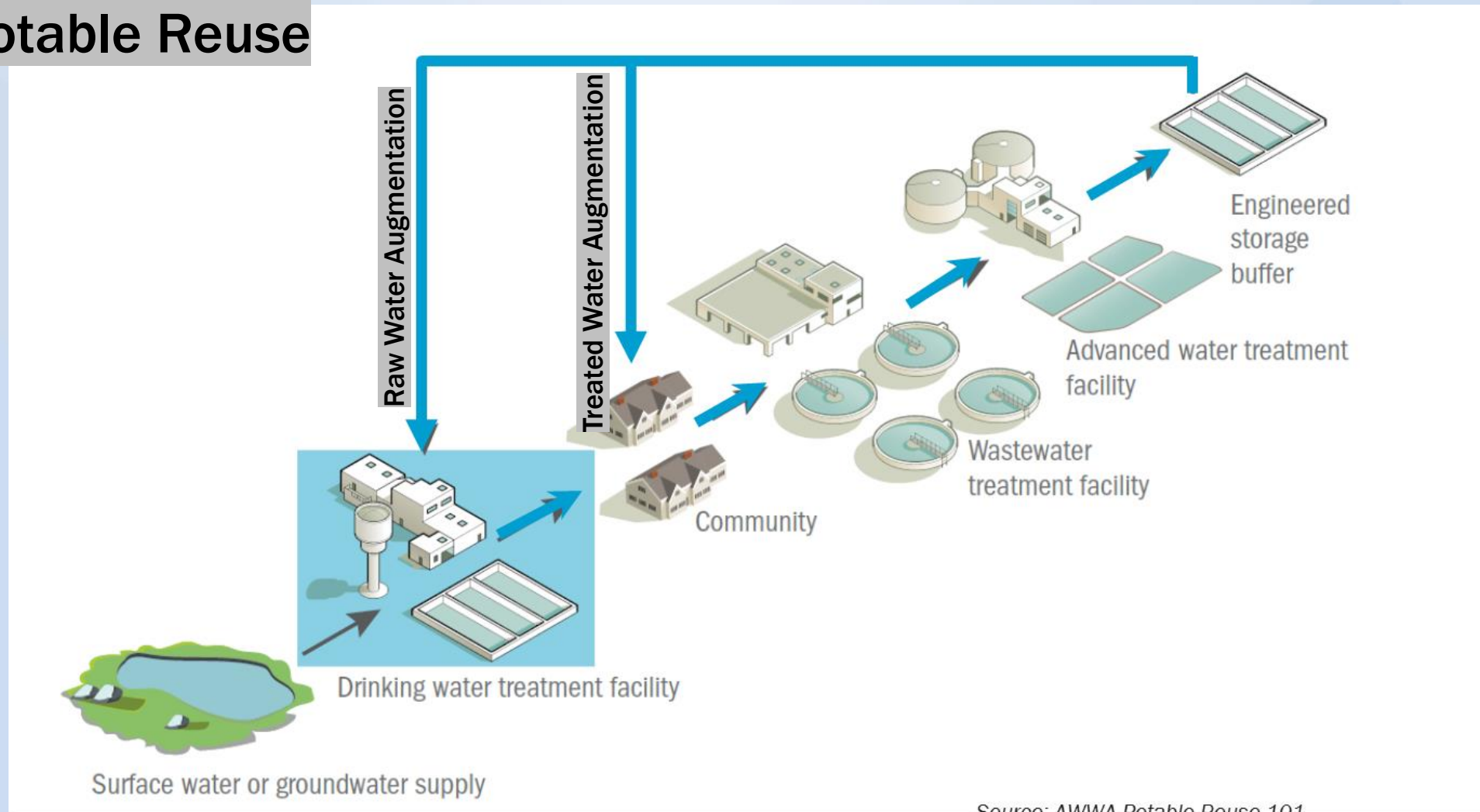
Indirect Potable Reuse by Groundwater Recharge



Source for base graphic: AWWA Potable Reuse 101

Definition of Potable Reuse

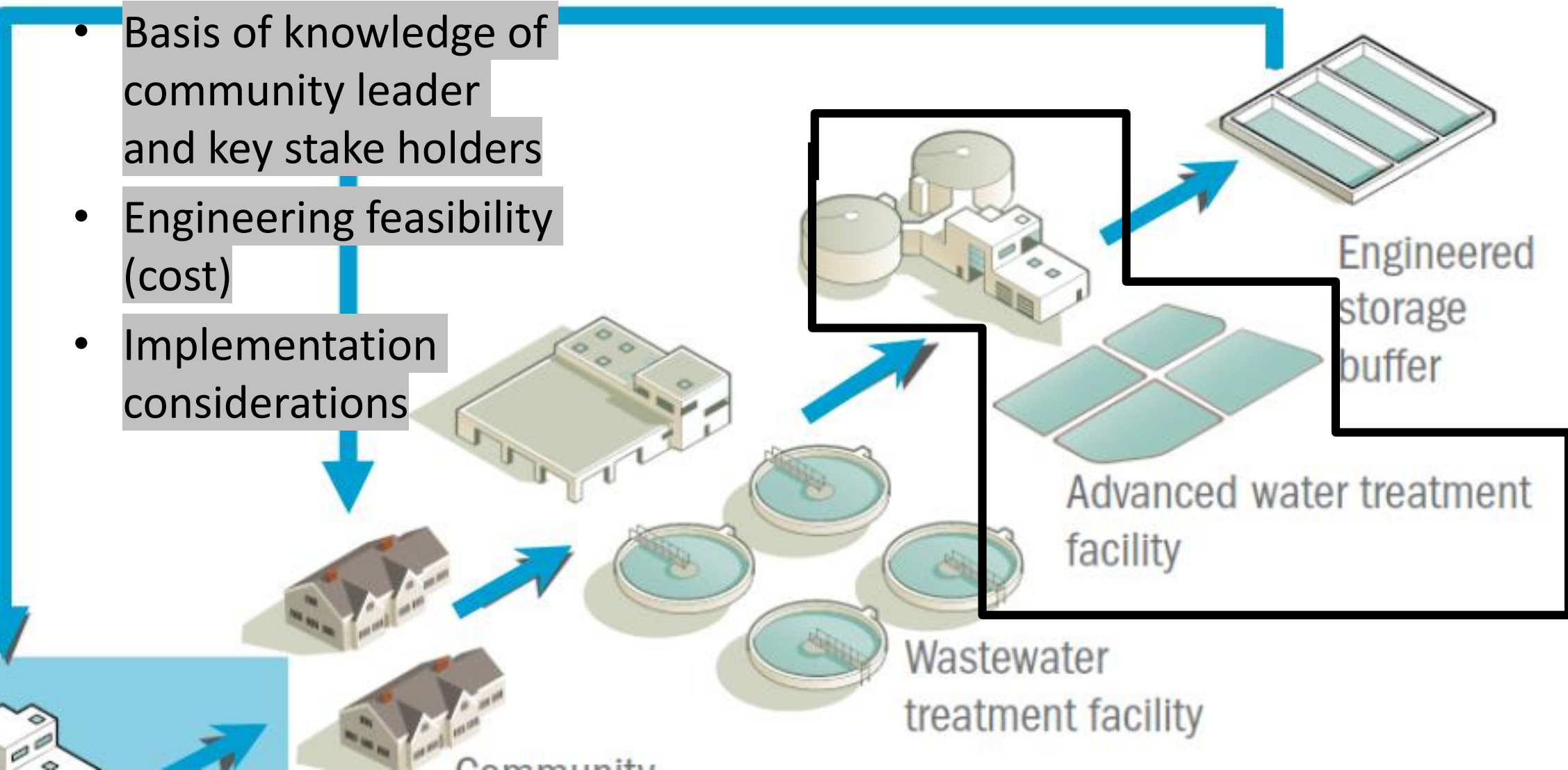
Direct Potable Reuse



Source: AWWA Potable Reuse 101

Study Objectives

- Basis of knowledge of community leader and key stake holders
- Engineering feasibility (cost)
- Implementation considerations



Stakeholder Interviews

Conducted by Katz and Associates May 2018

Groups Interviewed

- AZ Segway and Pedal Tours/Flagstaff Sports Exchange
- City of Flagstaff Mayor
- City of Flagstaff, City Council
- City of Flagstaff Water Commission
- Coconino County District 1
- Coconino County Superior Court
- Economic Collaborative of Northern Arizona
- Friends of Flagstaff's Future
- Friends of the Rio de Flag
- Greater Flagstaff Chamber of Commerce
- Northern Arizona Leadership Alliance
- Northern Arizona Association of Realtors

Topics Covered

- ✓ **Opinion of Adequacy of Water Supplies**
- ✓ **Awareness of planning for new water supplies**
- ✓ **Awareness of recycled water use**
- ✓ **Potential use of recycled water as source for drinking water**
- ✓ **Trusted sources of information regarding water issues**

Stakeholder Interviews – Key Takeaways

Positive Feedback:

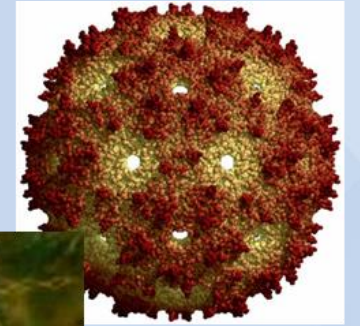
- ✓ Aware of current recycled water use
- ✓ Aware there is not enough reclaimed water supply to maintain current use and potable reuse
- ✓ Potential use of recycled water as source for drinking water

Concerns:

- Pharmaceuticals and endocrine disruptors
- Preference for indirect potable reuse due to public perceptions
- Cost and energy efficiency
- Needs to be presented to public in an easily understandable way
- Water quality and effects on human health and the environment

Advanced Treatment Goals

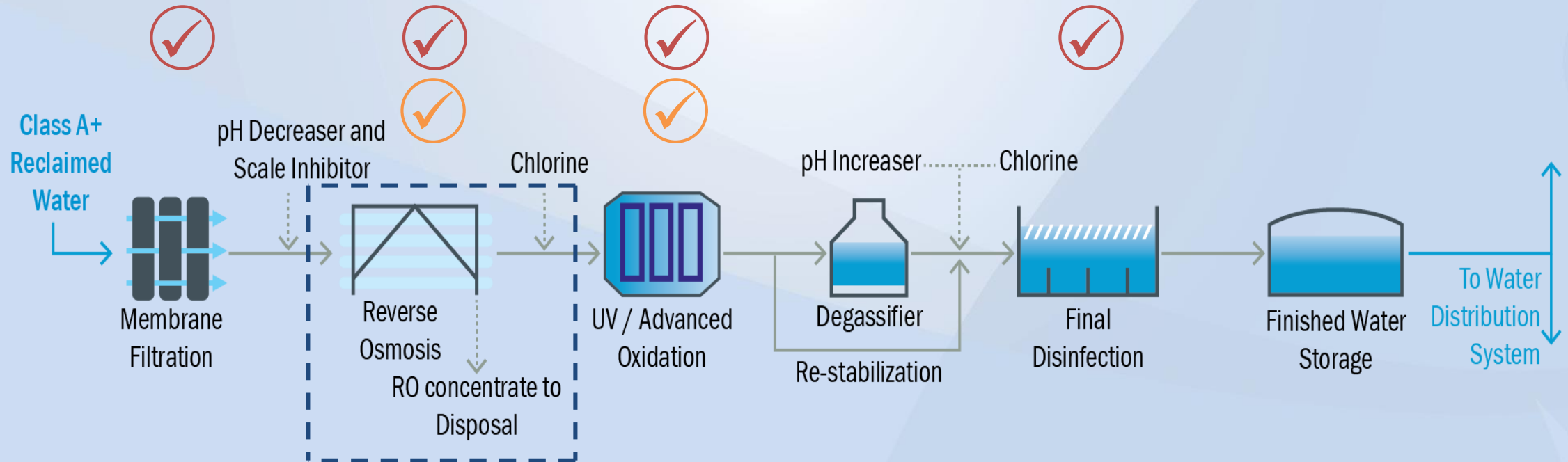
- Regulated under Safe Drinking Water Act
- Multiple Barrier Approach
- Microbial Contaminant Control
 - At least 12 log (99.9999999999%) removal of viruses
 - At least 10 log (99.99999999%) removal of bacteria
 - At least 10 log (99.99999999%) removal of protozoa
- Chemical Control
 - EPA Drinking Water Standards
 - Pharmaceuticals, Personal Care Products, other trace chemicals (CECs)
 - Total dissolved solids
- ***Community decision on “How Clean is Clean?” Water Quality Goals***



Treatment Options

RO-Based Advanced Water Treatment

- ✓ Pathogen removal
- ✓ Chemical control



Treatment Options

RO-Based Advanced Water Treatment

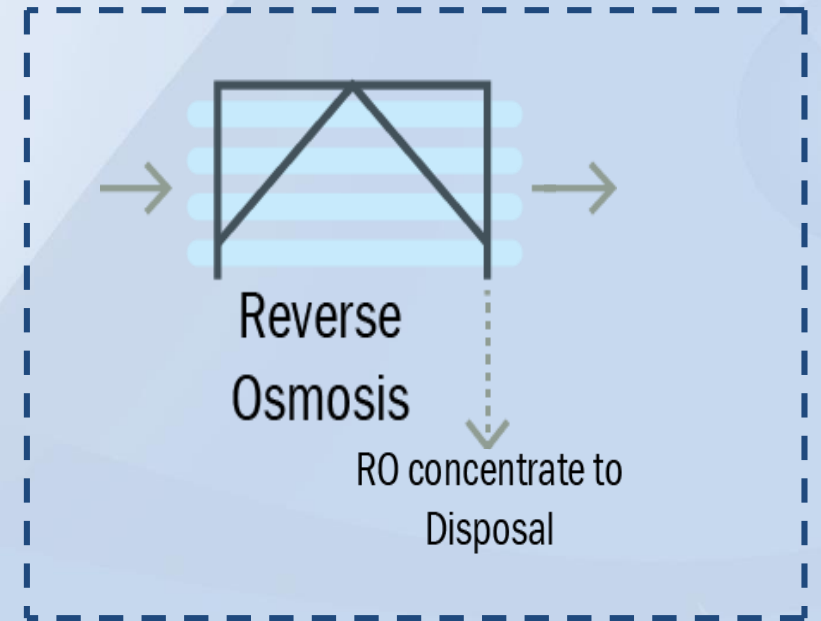
Key Considerations

✓ Pathogen Removal

- No or limited virus removal in micro/ultrafiltration

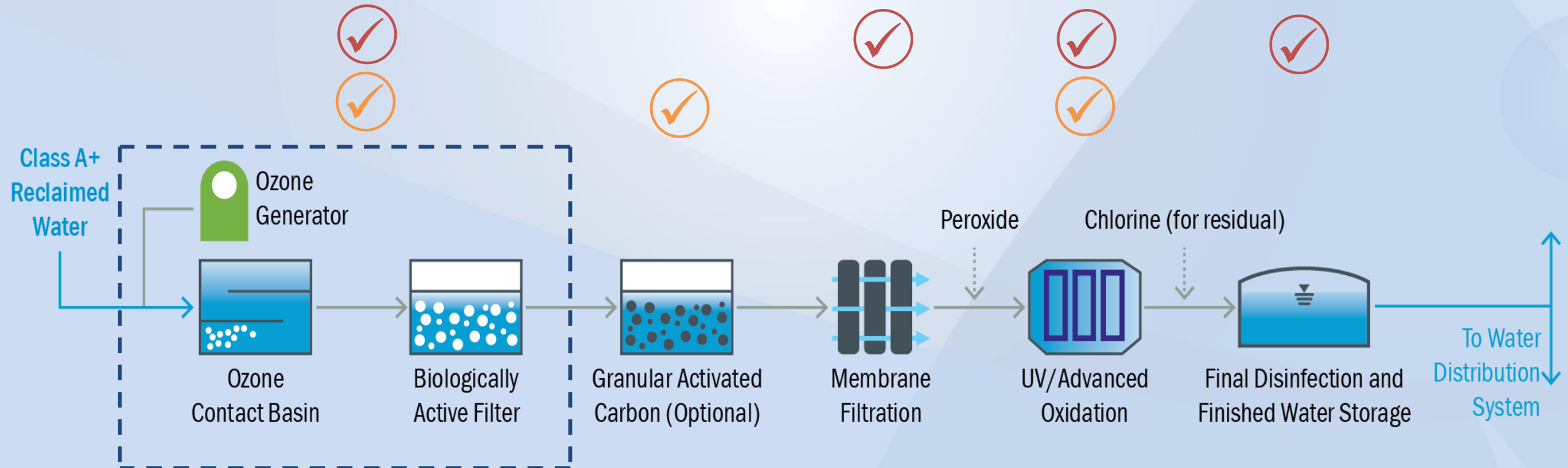
✓ Chemical Control

- RO concentrate management is difficult and costly
- High energy requirements



Treatment Options

Ozone/BAF-Based Advanced Water Treatment



Treatment Options

Ozone/BAF-Based Advanced Water Treatment

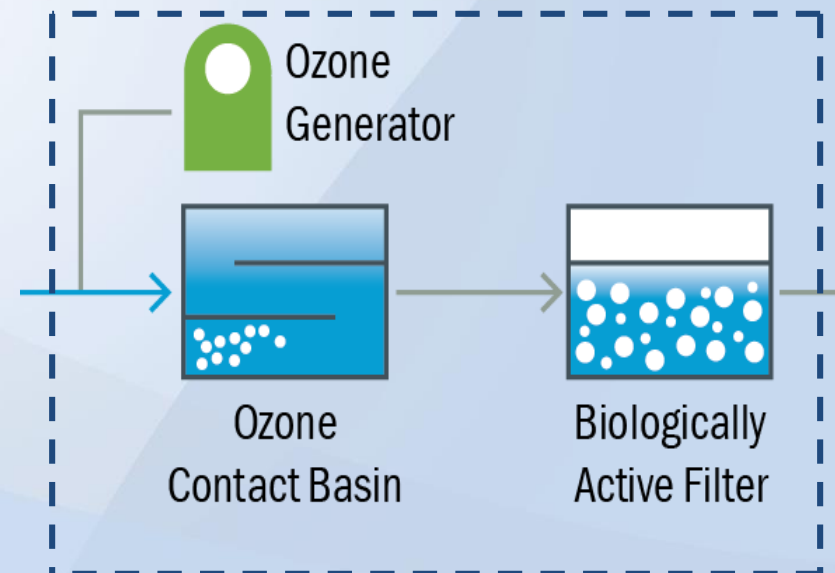
Key Considerations

✓ Pathogen Removal

- No or limited virus removal in micro/ultrafiltration
- Higher pathogen reduction credits than RO

✓ Chemical Control

- No salinity reduction in ozone/BAF
- Opportunities for blending, sidestream treatment



Advanced Water Treatment Process Comparison

	RO Based Process	Ozone-BAF Based Process
Removal of trace chemicals	○	○
Prevents disinfection by-product formation	○	○
Removes salt	○	
Produces high salinity waste stream	○	
Requires minerals to re-stabilize water	○	
Energy Consumption	122 kw/mgd	67 kw/mgd
Log Reduction Credits	12/11/11	12/10/10

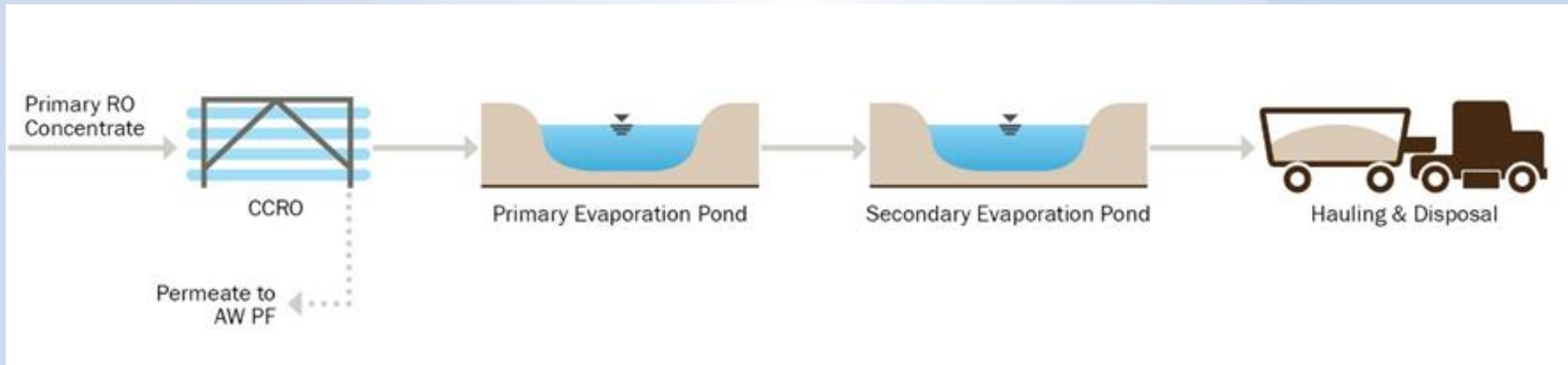
Conceptual Site Layout at Wildcat Hill WRP

Ozone-BAF Based Treatment



AWT Footprint
At Buildout: 3.4 acres

RO Brine Disposal



Conceptual Site Layout at Wildcat Hill WRP

RO Based Treatment



AWT Footprint

At Buildout: 4.1 acres



Pond sizes

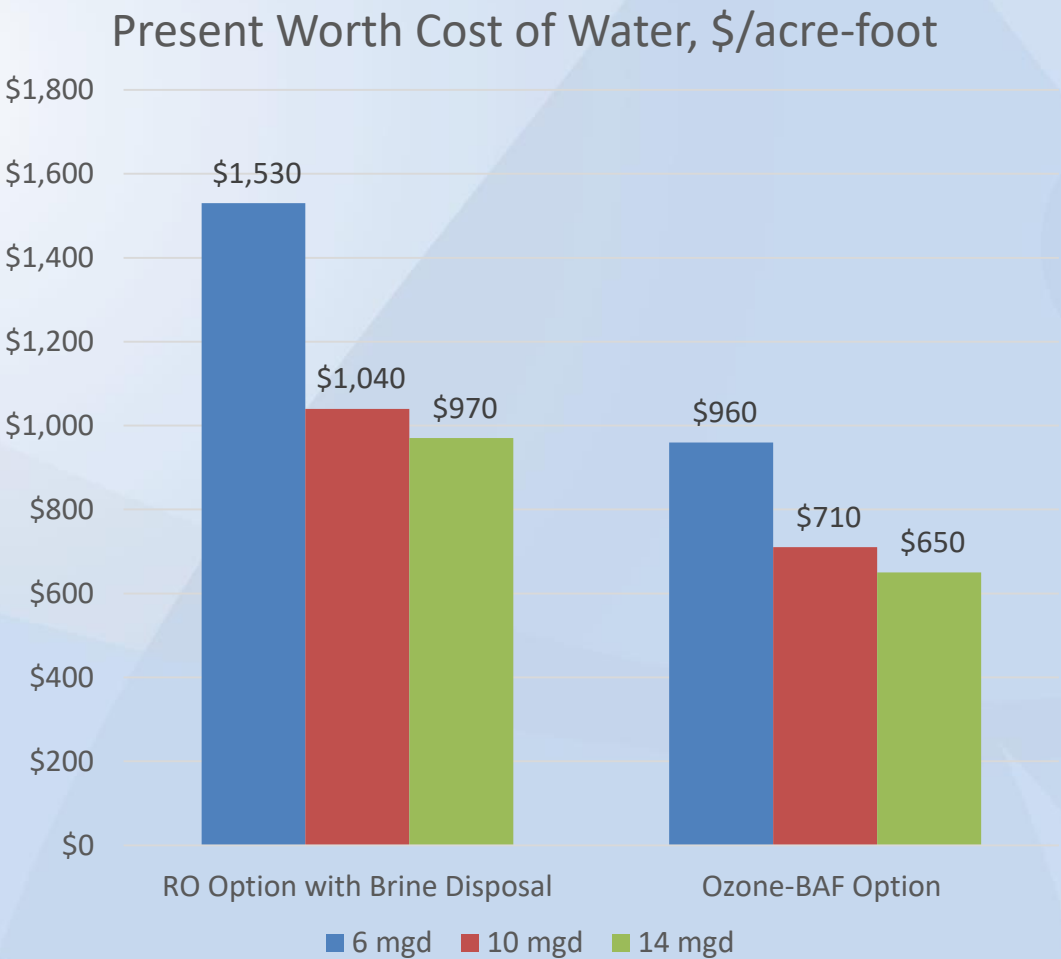
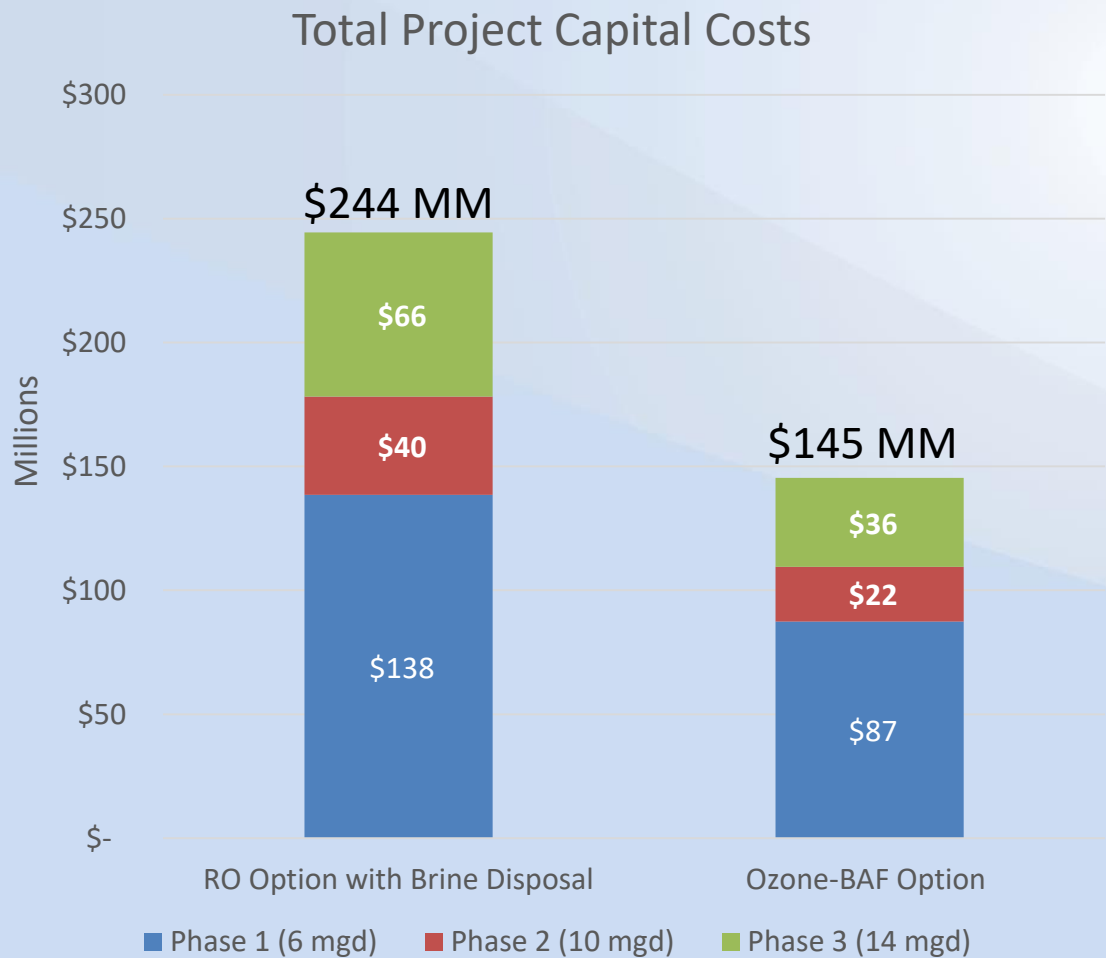
Phase 1 (6 mgd): 15.3 acres

Phase 2 (10 mgd): 25.5 acres

Buildout (14 mgd): 35.7 acres

Comparison

*1 MGD = 1120 afy



Implementation Considerations

- Pilot/Demonstration Facility
 - Determine the Community's Water Quality Goals "How Clean is Clean?"
- Source Control Survey
- Water Quality Sampling and Monitoring
- Salinity Management Model
- Operator Training and Certification
- Funding and Financing
- Compare costs & availability to possible future water supply sources (e.g. Potable Reuse (IPR, DPR), Red Gap Ranch, Water Conservation, etc)

Conclusion

- ✓ Basis of knowledge of community leader and key stake holders
- ✓ Engineering feasibility (cost)
- ✓ Implementation actions

Is Potable Reuse
the Answer?

Questions?





Professionals Dedicated To Arizona's Water



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Statements of fact and opinion expressed are those of the author(s)/presenter(s).

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